N 536 - Utilization of Nursing Research in Advanced Practice, Summer 2008

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Research Design

Contributors
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Design Characteristics

- Maximizes control over factors to increase the validity of the findings
- Guides the researcher in planning and implementing a study
Level of Control: Quantitative Research

- Descriptive
- Correlational
- Quasi-experimental
- Experimental

Increased Control with Design
Causality

A
Pressure

B
Ulcer

Multicausality

Years smoking
High fat diet
Limited exercise

Heart disease
Concepts Relevant to Research Design (2)

- Probability: Likelihood of an outcome
- Bias: Slanting findings
- Manipulation: Treatment
- Control: All phases of design
Design Validity

• Measure of accuracy of a study

• Examined with critique of the following dimensions:
  o Statistical conclusion validity
  o Internal validity
  o Construct validity
  o External validity
Elements of a Strong Research Design (1)

- Controlling the environment of the study setting

- Levels of controlling:
  - Natural setting
  - Partially controlled setting: e.g., clinics
  - Highly controlled setting: e.g., laboratory
Elements of a Strong Research Design (2)

- Controlling the equivalence of subjects and groups
  - Random subject selection
  - Random assignment to groups
Elements of a Strong Research Design (3)

- **Controlling the treatment**
  - Choose a treatment based on research and practice
  - Develop a protocol for implementation
  - Document the implemented treatment
  - Use a check-list to determine the extent of completeness to which the treatment was implemented
  - Evaluate the treatment during the study
Elements of a Strong Research Design (4)

- Controlling measurement
  - Reliability
  - Validity
  - Number of measurement methods
  - Types of instruments
Elements of a Strong Research Design (5)

- Controlling extraneous variables
  - Identify and eliminate extraneous variables via sample criteria, choice of settings, or research design
  - Random sampling
  - Sample: Heterogenous, homogeneous, or matching
  - Statistical control
Problems with Study Designs

- Inappropriate for the study purpose or the research framework
- Poorly developed designs
- The research methods were poorly implemented
- Inadequate treatment, sample, or measurement methods
Selecting a Design

Is there a treatment?

- No
- Yes

Is the primary purpose examination of relationships?

- No
- Yes

Descriptive Design

Will the sample be studied as a single group?

- No
- Yes

Correlational Design

Quasi-Experimental Study

Is the treatment tightly controlled by the researcher?

- No
- Yes

Will a randomly assigned control group be used?

- No
- Yes

Is the original sample randomly selected?

- No
- Yes

Experimental Study
Selecting a Descriptive Design

Examine sequences across time?
- Yes
  - Following same subjects across time?
    - Yes
      - Single unit of study
    - No
      - Studying events partitioned across time?
        - Yes
          - Repeated measures of each subject
        - No
          - Trend Analysis
    - Data collected across time
  - No
    - Comprative Descriptive Design

One Group?
- Yes
  - Comparative Descriptive Design
- No
  - Cross-sectional design

Research Design

Cross-sectional design with treatment partitioning
Longitudinal design with treatment partitioning
A Typical Descriptive Design

Clarification  ➔  Measurement  ➔  Description  ➔  Interpretation

Variable 1 ➔ Description of Variable 1

Variable 2 ➔ Description of Variable 2

Variable 3 ➔ Description of Variable 3

Variable 4 ➔ Description of Variable 4

Interpretation of Meaning ➔ Development of Hypotheses
A Comparative Descriptive Design

Group I
{variables measured}

Describe

Comparison of Groups on Selected Variables

Interpretation of Meaning

Group II
{variables measured}

Describe

Development of Hypotheses
Selecting the Type of Correlational Design

Describe relationships between/among variables?
- Descriptive correlational design

Predict relationships between/among variables?
- Predictive correlational design

Test theoretically proposed Relationships?
- Model testing design
A Descriptive Correlational Design

Measurement

Research Variable 1

Description of variable

Examination of Relationship

Interpretation of Meaning

Development of Hypotheses

Research Variable 2

Description of variable
A Predictive Design

Value of Intercept + Value of Independent Variable 1 + Value of Independent Variable 2 = Predicted Value of Dependent Variable
Selecting The Type of Quasi-Experimental Design

- Control Group?
  - No
    - Pretest?
      - No
        - One-group post-test only design
      - Yes
        - Repeated Measures?
          - No
            - Strategy for Comparison
              - Suggest Reevaluating design
              - One group pretest/post-test design
          - Yes
            - Compare treatment & control conditions?
  - Yes
    - Pretest?
      - No
        - Repeated Measures?
          - No
            - Strategy for Comparison
          - Yes
            - Compare treatment & control conditions?
Selecting The Type of Experimental Design

- **Pretest**
  - No
    - Post-test only control group design
  - Yes
    - Repeated Measurements?
      - No
        - Examine effects of confounding variables?
          - No
            - Multiple sites?
              - Yes
                - Randomized Block Design
              - No
                - Examination of complex relationships among variables in relation to treatment
            - Yes
              - Blocking?
                - No
                  - Comparison of multiple levels of treatment
                - Yes
                  - Randomized Block Design
      - Yes
        - Repeated measures design

Research Design
## Pretest-Post Test, Control Group Designs

<table>
<thead>
<tr>
<th>Measurement of dependent variables</th>
<th>Manipulation of independent variables</th>
<th>Measurement of dependent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomly selected experimental group</td>
<td>PRETEST —— TREATMENT —— POST-TEST</td>
<td></td>
</tr>
<tr>
<td>Randomly selected control group</td>
<td>PRETEST —— POST-TEST</td>
<td></td>
</tr>
</tbody>
</table>

- **Treatment:** Under control of researcher
- **Findings:**
  - Comparison of pretest and post-test scores
  - Comparison of experimental and control groups
  - Comparison of pretest-post-test differences between samples
- **Example:** Your self (1990). The impact of group reminiscence counseling on a depressed elderly population.
- **Uncontrolled threats to validity:**
  - Testing
  - Mortality
- **Instrumentation**
  - Restricted generalizability as control increases
## Post-Test-Only Control Group Design

<table>
<thead>
<tr>
<th>Measurement of independent variables</th>
<th>Measurement of dependent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomly selected experimental group</td>
<td>TREATMENT</td>
</tr>
<tr>
<td>Randomly selected control group</td>
<td>POST-TEST</td>
</tr>
</tbody>
</table>

- **Treatment:** Under control of researcher
- **Findings:** Comparison of experimental and control groups
- **Uncontrolled threats to validity:** Instrumentation, Mortality, Limited generalizability as control increases
### Nested Design

#### Pain Control Management

<table>
<thead>
<tr>
<th>Traditional care</th>
<th>PRN Medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit A</td>
<td>Unit E</td>
</tr>
<tr>
<td>Unit B</td>
<td>Unit F</td>
</tr>
<tr>
<td>Unit C</td>
<td>Unit G</td>
</tr>
<tr>
<td>Unit D</td>
<td>Unit H</td>
</tr>
</tbody>
</table>

#### Primary Nursing Care

<table>
<thead>
<tr>
<th>Primary Care</th>
<th>No Primary Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit A</td>
<td>Unit E</td>
</tr>
<tr>
<td>Unit B</td>
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<tr>
<td>Unit D</td>
<td>Unit H</td>
</tr>
</tbody>
</table>

**New approach:** “Around the clock” medication

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Research Design
Advantages of Experimental Designs

- More controls in design and conducting a study
- Increased internally validity
  - Decreased threats to design validity
- Fewer rival hypotheses
Advantages of Quasi-Experimental Designs

- More practical
  - Ease of implementation
- More feasible
  - Resources, subjects, time, setting
- More generalizable
  - Comparable to practice
Developing the Design Section of Your Proposal

- Identify the design
  - Name it specifically
- Provide a map of the design
- Discuss your rationale for using this design
- Describe threats to the validity of the chosen design